REMARKS/ARGUMENT

Claims 1 and 15 have been amended to require Si content of 1 to 3%. Support for this limitation exists, *inter alia*, at par. [0015] of the present application.

Claims 1-18 are currently pending.

The Office Action rejected the pending claims under 35 U.S.C. § 103 as obvious over JP 2000-337334 ("Namimura") in view of U.S. patent application publication no. 2002/0179207 ("Koike"), JP 59-226116 ("Hijkata") or U.S. patent 3,677,829 ("Stefayne"). In view of the following comments, Applicants respectfully request reconsideration and withdrawal of this rejection in view of the following comments.

The pending claims all require, among other things, the presence of (1) 0.51-2.5% Cr; and (2) at least 1% Si; and (3) bluing treatments. Thus, the pending claims cover those bolts having improved relaxation resistance properties, but exclude those bolts which do not (bolts containing less than 0.51% Cr, less than 1% Si and which do not undergo the required bluing treatments).

The high-strength product of the present invention is obtained by wire-drawing a bolt steel containing, among other ingredients, 1 to 3% Si, 0.51 to 2.5% Cr, proeutectoid ferrite, proeutectoid cementite, bainite and martensite at a total area rate of less than 20% and pearlite in balance; cold-heading the wire into a bolt shape; and then subjecting the bolt comprising 1 % to 3% Si to a bluing treatment in a temperature range of 100 to 500°C to form a solid solution of Si in the ferrite. By subjecting the bolt containing 1-3% Si to the required bluing treatment, the relaxation resistance of the bolt is significantly improved (as compared to a bolt not subjected to the required bluing treatment containing 1.46% Si and/or a bolt subjected to the required bluing treating but containing less than 0.55% Si). (See, pars. [0045] and [0046], Table 4 and Fig. 4 of the present application). Thus, Si content and the required bluing treatments, together, are critical elements of the present invention which are neither taught nor suggested by the applied art.

Moreover, because the Si is solid-solubilized in the ferrite in the present application, the relaxation resistance of the required bluing treatment is enhanced. (See, pars. [0015] and [0030] of the present application). This is another critical element of the present invention which is neither taught nor suggested by the applied art.

Namimura's bolts are formed by warm-forging a steel wire. (See, par. [0007]). Significantly, no bluing treatment occurs. Because Namimura's bolt is not subjected to a bluing treatment, the relaxation resistance of the bolt is not improved (see discussion above of Table 4 and Fig. 4 of the present application for the example containing 1.46% Si). Thus, Namimura would not lead one of ordinary skill in the art to the present invention having the improved properties discussed above for at least the reason that it does not teach, suggest or

recognize the importance of the required bluing treatments, particularly in combination with Si content.

Furthermore, Namimura teaches that pearlite area rate is preferably 100% (see, par. [0012]), meaning that ferrite area rate is preferably 0%. Thus, Namimura teaches that it is preferred that ferrite does not exist, meaning that the solid solution would preferably not form in the non-existent ferrite in Namimura. In other words, Namimura does not teach, suggest or recognize the importance or significance of forming the solid solution in the ferrite, meaning that Namimura cannot teach or suggest the present invention.

Namimura's teachings are further fatally deficient in that Namimura emphasizes the preference for low Si content of less than 1% (see, par. [0018]) which, combined with its failure to recognize the importance of the required bluing, means that Namimura leads to inferior bolts. (see discussion above and discussion of pars. [0045]-[0046] and Fig. 4 of the present application for the example containing 0.55% Si).

Koike cannot compensate for Namimura's many fatal deficiencies.

Koike, at pars. [0025]-[0026], expressly limits Si content to 0.5%. In this regard, Koike explains that "the excessive Si content is likely to lower the ductility as well as the cold heatability of the steel wire," and then indicates that preferred Si content is 0.1% or 0.05%. (Par. [0026]). Furthermore, comparative example F in Koike contains 0.89% Si. Table 3 (test no. 8) indicates that this sample "cracked," and thus was unacceptable. The clear teaching of Koike was that Si content greater than 0.5% was unacceptable and should not be used, particularly when cold heading is performed. Stated another way, Koike actually teaches away from cold heading when Si content is greater than 0.5%.

Further, Namimura teaches warm forging. In contrast, Koike is limited to cold forging (see, par. [0040]) and, in fact, teaches away from warm forging in par. [0021] by stating that warm forging detracts from strength of the product. Thus, these references are not properly combinable: that is, given Namimura's express limitation to warm forging, one of ordinary skill in the art would not have been motivated to modify Namimura's teachings related to warm forging using Koike's cold forging techniques. Stated another way, given that Namimura is directed to warm-forging, the combination of these references cannot lead to cold heading a product containing 1-3% Si and, thus, cannot lead to the present invention.

Also, Koike, like Namimura, teaches that an area rate of pearlite is preferably 100% (see, par. [0018]), meaning that ferrite preferably does not exist so that a solid solution of Si in the ferrite is not formed. Thus, the combination of the applied art would not lead one of ordinary skill in the art to the claimed invention in which the Si is solid-solubilized in the ferrite.

Also, Koike is fatally deficient because it teaches away from steel containing more than 0.5% Cr -- Koike teaches that Cr exceeding 0.5% does not further reduce proeutectoid cementite. (See, for example, pars. [0034]-[0035]). Thus, Koike would not motivate one of ordinary skill in the art to ignore Namimura's express teaching to use less than 0.5% Cr. In other words, the combination of applied references would not lead to a steel product having the required Cr content and, thus, cannot constitute the basis for a proper rejection given that one of the required elements is lacking from their combination.

Hijikata and Stefayne are similarly deficient and cannot compensate for Namimura's fatal deficiencies.

Hijikata discloses a bolt having a martensite inner structure and a pearlite surface layer (see, page 2, right column, lines 6-8). In stark contrast, Namimura teaches that in cross section of his bolt that the area rate of structures such as martensite is less than 20% and that of pearlite is 80% or more (see, pars. [0012] and [0045]). Thus, Namimura and Hijikata are not properly combinable as they are directed to different types of products, having different structures, so teachings related to Hijikata's surface coated product teach or suggest nothing about Namimura's product. One of ordinary skill in the art would not look to guidance from Hijikata's surface coated product regarding how to make Namimura's product.

Further, Hajikata teaches that carbon content above 0.6% carbon is not necessary due to causing a delayed fracture (see, page 3, left column, lines 15-20). Thus, Hajikata teaches away from being combined with Namimura which teaches that the preferred lower limit for carbon is 0.65% (see, par. [0016]). The teachings, and products resulting from these teachings, are incompatible.

Regarding Stefayne, the bluing treatment disclosed in Stefayne is completely different from the required bluing treatment. For example, the bluing temperature is controlled by contacting the steel product to organic vapors having a boiling point of 305-360°C for 30 minutes or less (see, col. 2, lines 35-46 and col. 3, lines 38-42). So, even if Namimura's bolt is treated according to Stefayne's bluing treatment, the benefits of the present invention (including improved relaxation resistance) would not be obtained. Accordingly, the combination of Namimura and Stefayne would not lead to the present invention.

Given the many identified deficiencies of the applied art, one of ordinary skill in the art would not have produced invention bolts having improved relaxation resistance properties. Instead, the art would be without such bolts. It is only because the present inventors went directly against the disclosures of the applied art that they were able to discover bolts having the improved relaxation resistance properties of the present invention.

In sum, the applied art would not have motivated one skilled in the art to arrive at the claimed invention requiring require the presence of (1) 0.51-2.5% Cr; and (2) at least 1% Si; and (3) the required bluing treatments, but rather would have led one skilled in the art away from it. Under such circumstances, the claimed invention cannot be obvious.

In view of the above, Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. § 103.

Applicants believe that the present application is in condition for allowance. Prompt and favorable consideration is earnestly solicited.

Respectfully submitted,

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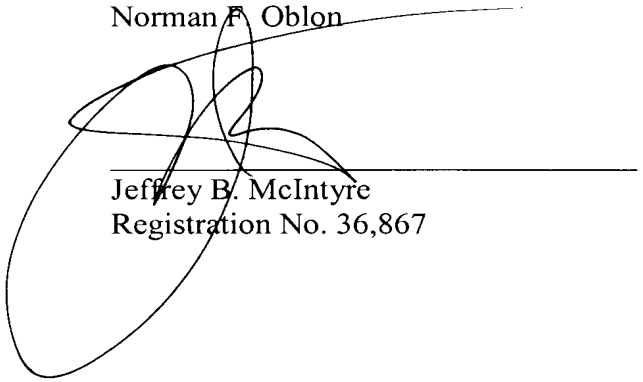

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